Regeneration Programs Section

Silviculture Branch, 31 Bastion Square, Victoria, B.C. V8W 3E7

December 11, 1990

To: All Regions
All Districts

Re: PLANTING SPOT SELECTION ON
MECHANICALLY PREPARED SITES

Please find attached an excellent Swedish publication about correct planting spot selection on mechanically prepared sites. The article has recently been translated by Ernst Stjernberg of FERIC.

The article's recommendations should help silviculturists develop appropriate mechanical site preparation and planting prescriptions. There are two statements in the report which do not always apply to British Columbia conditions.

1. Locating the planting spot at least 20 cm from undisturbed ground is recommended in Sweden in order to reduce tree mortality due to the root collar weevil.

2. Brush competition in Sweden is not severe and therefore mounds larger than 40 L are not required.

The Regeneration Programs Section is planning to produce a training video and accompanying brochure on proper planting spot selection in 1991.

In the meantime, plant the right spot.

Charles von Hahn
Planting Programs Specialist
Silviculture Branch

Attachment

Province of
British Columbia
Ministry of
Forests

SELECTING PLANTING SPOT

[Val av planteringspunkt

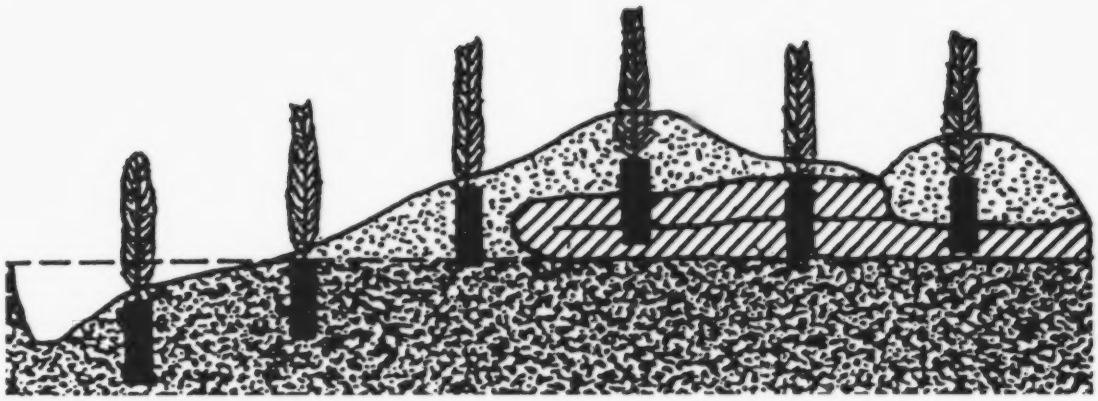
by

Göran Adelsköld
Göran Örlander, SLU

Result No. 8; Forskningsstifcelsen Skogsarbeten]

[An unofficial translation by Ernst Stjernberg, R.P.F.
FERIC, Western Division]

SELECTING PLANTING SPOT



Sketch: Birgitta Engström

Summary

Because seedlings need good growing conditions, planting spots at six different microsite locations were defined (see sketch above). From left to right, they are: patch below level of mineral soil; patch level with mineral soil; mound on mineral soil; mound on inverted humus; inverted humus; mound on undisturbed humus. Planting spots in disc trenched furrows are therefore considered the same as those in a scalped patch and those in a berm, created by a disc trencher or a plow, are considered to be in mounds. Further, ten different site classes were distinguished, with respect to ground moisture class, soil texture and the risk of drought after the planting. The planting spots are then classed, for each site class, as acceptable, acceptable with reservations, and unacceptable.

The classification shows, in general, that in dry ground conditions the mound on mineral soil and the patch planting spots are preferable to the others. On a fresh, fine sand moraine, the mound on mineral soil and mound on inverted humus are better microsites than the patch locations. On fresh, silty soils and on moist sites the best planting spots are mound on inverted humus, mound on undisturbed humus, and inverted humus. In these three microsites the seedlings must also be planted deeper than is normal to avoid drought.

Background

Seedlings are too often planted below ground level in the scalp or the trench instead of in the mound or the elevated berm close by, Figure 1. A suitable planting spot above ground level maybe missing, but the reason may also be a lack of information and checking, or a too strict requirement for correct spacing.

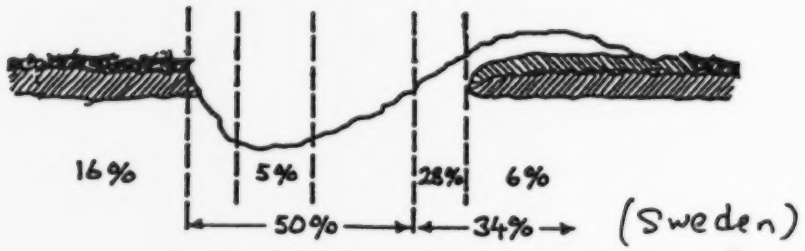


Figure 1: Placement of planted seedlings on site prepared sites: whole country. Source: Planting Inventory 1983, Forest Service

In the following recommendations, consideration has only been given to the requirement for good growing conditions. The long term effects of site preparation must also be considered when choosing the site preparation method or when setting the adjustments on the chosen tool. At these times, how much surface area should be treated and how deep the treatment should be are also considered. However, the planter has to utilize the site preparation result in the best way, regardless of how it was done.

Definitions

Planting area is here defined as the site prepared area within which there are one or more of the planting spot locations shown in Figure 2.

To avoid having the definitions of microsite locations dependant upon the site preparation method used, a planting area in a disc trenched furrow is considered to be in a scalped patch. In analogy with this, a planting area on a berm is considered to be on a mound.

Figure 2 shows the six different microsite locations that were defined. The following general conditions apply to these locations.

- The area of continuous, exposed mineral soil in the microsite should be at least 40 x 50 cm (2000 cm^2). This includes mineral soil on top of inverted or undisturbed humus, plus exposed rocks.

- The planting spot should be located at least 20 cm from undisturbed ground, i.e. where the ground vegetation is not disturbed.

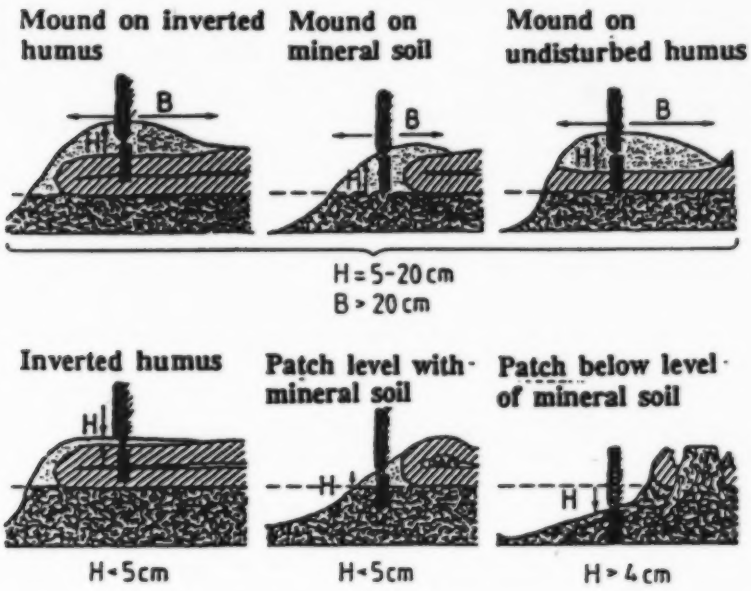


Figure 2: Sketches of the principles of the defined planting spots. H gives average height and B width in the figures. The dotted line shows the mineral soil level A negative value of H indicates that the spot is below this level.

In a mound, the thickness of the mineral soil layer should be at least 5 cm and not more than 20 cm (H in Figure 2). Depending on the type of mound, the height is measured from the surface of the inverted humus, from the level of mineral soil or from the surface of the undisturbed humus layer. The mound should have four 20-cm sides. With this definition, the mound contains at least 5 L of mineral soil. With a height of 10 cm, the volume is about 15 L and at a height of 20 cm, the volume is about 80 L. Presently the desired volume is in the range of 10 to 40 L.

A mound on inverted humus which does not meet these size requirements is defined as inverted humus. If the inverted humus has no or little mineral soil it should have a continuous surface area of 40 x 50 cm. For microsites located on inverted humus, there should not be too much debris between the layers of humus. These spots should also have settled over a winter before they are used.

At least two-thirds of a mound on mineral soil should lie within the patch. If the size requirements are not fulfilled, the microsite is defined as a patch level with mineral soil. For both of these microsites the planting is, in practice, done in the "hinge". Such a spot is normally somewhat elevated but it is not always a mound.

Mounds on undisturbed humus are created when ditching for drainage and when mounding with excavator. If a mound on undisturbed humus is too small, the planting spot is unacceptable.

Mineral soil mixed with humus on top of undisturbed humus is classified as a mound on inverted humus. If the mound is too small the spot is unacceptable.

Thus, several different planting spots can normally be found within the same planting area; this was also the intention with the definitions. If there is a planting spot on a mound or on inverted humus, then there is also, as a rule, a planting spot in the patch, although the reverse is not true.

To classify the planting spots, ten site classes are defined. The factors that are considered are ground moisture class (dry, fresh, moist), soil texture (coarse, medium, fine) plus the risk of drought after planting (low and high). "Fine" texture means fine sandy moraine, or silt or clay (texture class FM according to the site classification system by the University of Agricultural Sciences).

In the planting season, the risk of drought is high in the eastern part of Sweden (low humidity) and low in the western part (high humidity). During early summer (May-June), the "0-level", i.e. where precipitation equals evaporation, is far to the west particularly in central Sweden. The weather conditions at planting time should also be considered. The risk of drought is usually lower in the fall than early summer.

Classification

The six microsite locations are, for every site class, classified as acceptable, acceptable with reservations, and unacceptable, see Figure 3. Note that the seedling is planted deeper than normal, i.e. deep-planting, in spots on inverted humus, mound on inverted humus, mound on undisturbed humus and, for sites with fine textured soils, on mound on mineral soil. Planting in patches, on the other hand, should never be done as deep-planting.

The planting spot on inverted humus has no, or a very thin layer of, mineral soil on top. The risk for attack by root collar weevil is therefore greater here than in other planting spots. Vegetation also returns fairly quickly on inverted humus. It is therefore not advisable to plant small container grown seedlings where the risk of root collar weevil attack is great or where herbs and grasses can create a lot of competition.

Evaluating the planting spots

On dry sites planting spots in patches or on mound on mineral soil are acceptable. Spots in humus or inverted humus are acceptable with reservations or unacceptable owing to the greater risk of moisture stress. This risk is greatest in inverted humus and on mound on undisturbed humus.

On fresh sites, the planting spot in patch below level of mineral soil is always unacceptable owing to minimal increase in soil temperature and lack of local drainage. Patch level with mineral soil is somewhat better in this respect. On fresh sites with coarse to medium textured soils and low drought risk, this planting spot location is acceptable with reservations, but where the risk for drought is great it is acceptable. If the soil texture is fine or the site moist, the soil temperature and moisture conditions are not improved adequately in a patch. The risk for frost heaving is also great on fine textured soils. Planting spots in patches on such sites are therefore unacceptable.

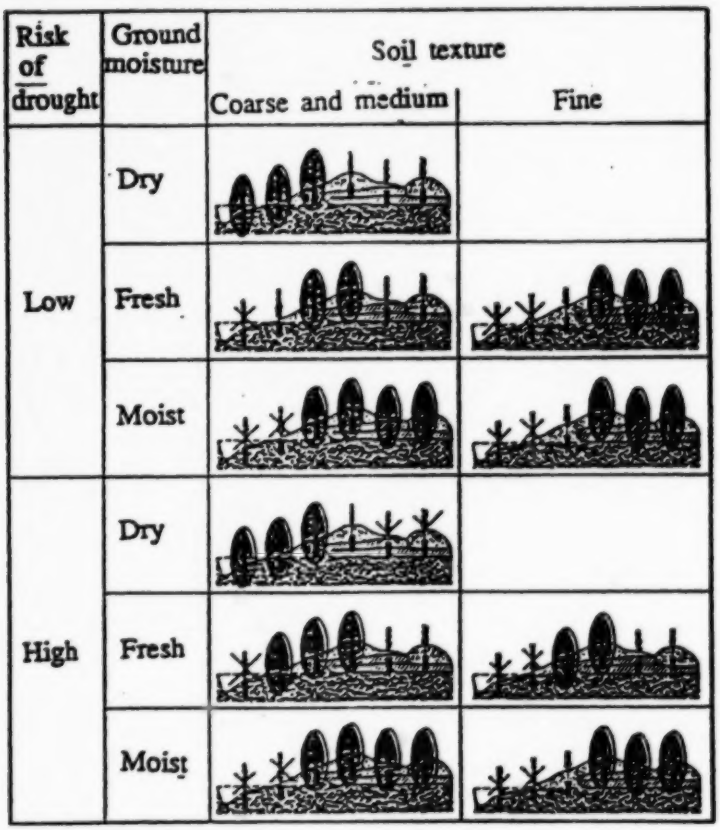


Figure 3: Classification of planting spots into acceptable (circled), acceptable with reservations (no marking) and unacceptable (crossed out). Seedlings planted in mound or inverted humus and in mound on undisturbed humus should be deep-planted

A ten centimetre thick mineral soil layer placed on undisturbed humus or on inverted humus reduces competition from vegetation and gives a certain amount of protection against evaporation. If the layer of mineral soil is very thin, the risk for drying out is greater. A quick regrowth of vegetation reduces ground moisture further. Microsites on inverted humus and mound on undisturbed humus are therefore only acceptable on sites where the drying out risk is considered low.

The microsite located on inverted humus is evaluated with caution. In the forest industry, there is an opinion that an inverted humus microsite is in many cases as good as one in mound on inverted humus.

Mound on mineral soil and mound on inverted humus are acceptable planting spots on all fresh and moist sites with coarse or medium textured soils. Mound on inverted humus gives greater changes in soil temperature and moisture plus, more nutrient release than mound on mineral soil. The mound on mineral soil planting spot is therefore preferable in cool and/or very humid climates and also on moist sites with fine-textured soils.

Many foresters think that the risk for frost heaving is too great when planting in mound on mineral soil having fine texture. This has also been proven in trials when the seedlings were planted at normal depth. Deep-planting in mound on mineral soil has however shown to reduce the risk of frost heaving considerably.

In a mound on inverted humus it is important that the mineral soil layer is not so thick that the roots cannot reach the humus layer under the inverted humus. The ground moisture remains high there even after prolonged dry spells. Since at most half of the green part of the seedling can be buried, the mineral soil layer should not be thicker than half the length of the green part, i.e. about 5-10 cm. If plowing is used it should be shallow, particularly if the soil texture is fine. When ditching for drainage and mounding with excavator, it is important to spread the excavated material so that the mounds do not get too high.

Only a few of the factors important to the seedling's establishment have been considered here. The species and some other important factors, e.g. temperature regime are missing. In colder climates planting spot locations on mounds are preferable.

The spacing of the planting spots is not discussed here, since it should be adjusted to the productivity of the site and depends on how the site preparation was done. To reach high timber production it is usually more important to consider the total number of trees per hectare rather than the spacing between them. Well-placed seedlings have a greater chance of survival and add more to the production than those that are badly placed. It is therefore 'better to choose the right planting spot than to strictly adhere to spacing requirements. It is possible to find more acceptable spots per hectare if the spacing is allowed to vary within reasonable limits, especially with continuous trenching and plowing.

These recommendations are based mainly on the research carried out at the Institute for Forest Management at the Swedish University of Agricultural Sciences. Definitive research results are still lacking for some evaluated microsites. Despite this, these recommendations can be the base for local directives.

Literature

Gemmel, P.; Örlander, G. 1989: Markberedning - Sveriges Skogsvardsförbunds Tidskrift, Nr 3, 1989. [Translated into English as Site Preparation, A Swedish Overview, FRDA Report 105, BCMOF]

Lundmark, J-E, 1988. Skogsrmarkens ekologi del 2. Skogsstyrelsen, 1988.

Key words: Site preparation, planting